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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,355	11/17/2003	Munchiro Tabata	040356-0496	9164

22428 7590 12/20/2006  
FOLEY AND LARDNER LLP  
SUITE 500  
3000 K STREET NW  
WASHINGTON, DC 20007

EXAMINER
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NGUYEN, TU MINH

ART UNIT	PAPER NUMBER
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3748

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/20/2006	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/713,355

Applicant(s)

TABATA ET AL.

Examiner

Tu M. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 15-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. An Applicant's Amendment filed on September 28, 2006 has been entered. Claims 1-9 and 11-14 have been canceled; and claims 15-28 have been added. Overall, claims 15-28 are pending in this application.

#### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 15, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. (EP Application EP 1,174,600 A2) in view of Moraal et al. (U.S. Patent 6,574,956).

As shown in Figures 1 and 4-7, Kobayashi et al. disclose a purification device for an exhaust gas of a diesel engine and a method for controlling said purification device, the diesel engine comprising a catalyst (17) which traps nitrogen oxides in the exhaust gas but decreases a nitrogen oxides trapping performance when poisoned by sulfur oxides in the exhaust gas, and a filter (18) which traps particulate matter in the exhaust gas, the device comprising a programmable controller (9) programmed to:

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- determine (step S401) if an elimination of the sulfur oxides poisoning the catalyst is required;
- perform a process of eliminating the sulfur oxides poisoning the catalyst, when elimination of the sulfur oxides poisoning the catalyst has been determined to be required (step S401 with YES answer, step S405 with YES answer, and step S407);
- determine if a regeneration of the filter is required while performing the process of eliminating the sulfur oxides (step S402 and Figure 5);
- perform (step S406) the regeneration of the filter while interrupting the process of eliminating the sulfur oxides, when the regeneration of the filter has been determined to be required (step S405 with NO answer and step S406);
- determine (step S405) during the regeneration of the filter if a residual particulate matter in the filter has decreased to a level; and
- stop the regeneration of the filter and resume the process of eliminating the sulfur oxides poisoning the catalyst, when the residual particulate matter in the filter has decreased to the level (step S405 with YES answer and step S407).

Kobayashi et al., however, fail to disclose that during the regeneration of the filter, the level is an amount of residual particulate matter in the filter above which the filter is allowed to be regenerated without causing thermal damage to the filter.

As indicated on lines 31-34 of column 1, Moraal et al. teach that it is conventional in the art to interrupt a regeneration cycle of a particulate filter if the filter temperature exceeds a temperature range having an ignition temperature as a lower limit (lines 49-51 of column 3) and a critical threshold as an upper limit. It is obvious that at a time of interruption, the filter is at a

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predetermined decrease state corresponding to a particulate matter trap amount smaller than a predetermined amount (an amount that activates the regeneration cycle) and larger than zero (when fully regenerated). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Moraal et al. in the device of Kobayashi et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to prevent thermal degradation to the filter.

4. Claims 16, 17, 20-24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. in view of Moraal et al. as applied to claim 15 above, and further in view of Hirota et al. (U.S. Patent 5,974,791).

Re claim 16, in the modified purification device of Kobayashi et al., the process of eliminating the sulfur oxides poisoning the catalyst is performed by causing the catalyst to contact with an exhaust gas corresponding to a rich air-fuel ratio.

Kobayashi et al., however, fail to disclose that the regeneration of the filter is performed by burning a trapped particulate matter by causing the filter to contact with an exhaust gas corresponding to a lean air-fuel ratio.

As shown in Figures 1-2, Hirota et al. teach an exhaust gas purification device comprising a DPF (10a) that is adapted to trap particulate matter, NO<sub>x</sub>, and SO<sub>x</sub> in the exhaust gas. Hirota et al. further teach that when it is time to purge particulate matter from the DPF (step 213 with YES answer), a lean exhaust gas composition at the DPF is required (step 215). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching taught by Hirota et al. in the modified purification device of

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Kobayashi et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art.

Re claims 17 and 26, the modified purification device of Kobayashi et al. further comprises a sensor (120, 130) which detects a differential pressure between an inlet and an outlet of the filter, and the controller is further programmed to determine if the regeneration of the filter is required based on the differential pressure, wherein the controller (9) is further programmed to determine that the residual particulate matter in the filter has decreased to a level which does not damage the filter, when the controller started to generate the exhaust gas corresponding to the rich air-fuel ratio for the first time.

Re claim 20, the modified purification device of Kobayashi et al. further comprises an intake throttle (8) which regulates an intake air amount of the engine, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the intake throttle.

Re claim 21, the modified purification device of Kobayashi et al. further comprises a fuel injector (10) which injects fuel into the exhaust gas of the engine, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of a fuel injection amount of the fuel injector.

Re claim 22, in the modified purification device of Kobayashi et al., the engine comprises an exhaust gas recirculation passage (23) which recirculates part of the exhaust gas into an intake air according to an exhaust gas pressure of the engine, the purification device further comprises an exhaust throttle (25) which regulates the exhaust gas pressure, and the controller is further

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programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the exhaust throttle.

Re claim 23, the modified purification device of Kobayashi et al. further comprises a fuel injector (19) which supplies fuel for combustion, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of a post-injection by the fuel injector after fuel is supplied for combustion.

Re claim 24, in the modified purification device of Kobayashi et al., the controller is further programmed to determine that the residual particulate matter in the filter has decreased to a level which does not damage the filter, when the exhaust gas has been maintained in a state corresponding to the lean air-fuel ratio for a predetermined time (see steps S405-S406).

5. Claims 18-19 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. in view of Moraal et al. and Hirota et al. as applied to claim 16 above, and further in view of legal precedent.

Re claims 18-19, the modified device of Kobayashi et al. discloses the invention as cited above, however, fails to disclose that the exhaust gas corresponding to the rich air-fuel ratio corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 0.95 to 1.0; and that the exhaust gas corresponding to the lean air-fuel ratio, corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 1.05 to 1.1.

Kobayashi et al. disclose the claimed invention except for specifying an optimum range of excess air factor of 0.95 to 1.0 and 1.05 to 1.1 for the rich air-fuel ratio condition and the lean

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air-fuel ratio condition, respectively. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of excess air factor for each of the rich air-fuel ratio and the lean air-fuel ratio condition, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claim 25, in the modified purification device of Kobayashi et al., the controller is further programmed to determine that the regeneration of the filter is required when the particulate matter trap amount is saturated. Kobayashi et al., however, fail to disclose that the residual particulate matter in the filter has decreased to the level which does not damage the filter when the particulate matter trap amount is zero.

Kobayashi et al. disclose the claimed invention except for specifying that a particulate matter trap amount is zero is a level at which a regeneration of the filter does not damage the filter. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of residual particulate matter in the filter to terminate the filter regeneration, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).



***Response to Arguments***

6. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that Kobayashi et al. do not interrupt a process of eliminating SOx in a NOx trap when a regeneration step of a particulate filter is required (page 8 of the Applicant's Amendment), the examiner respectfully disagrees.

As outlined in paragraph 3 above, the examiner has shown that Kobayashi et al. indeed interrupt a SOx regeneration step of the NOx trap (17) (i.e., step S407 is not performed) when a regeneration step of a particulate filter is required (step S405 with NO answer and step S406).

***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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*Prior Art*

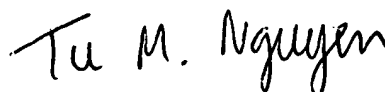
8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of one patent application: Nagaoka et al. (U.S. Patent Application 2005/-109022) further disclose a state of the art.

*Communication*

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TMN

December 11, 2006

Tu M. Nguyen

Primary Examiner

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